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ABSTRACT

The research project was designed to provide data pertaining to performance tasks in specific occupations in various areas of vocational/technical education. The data presented in the document is intended to be used to develop appropriate objectives and curricular content to assist in the preparation of individuals entering the specific photo-offset lithography occupations of layout man, paste-up man, lithographic cameraman, stripper, platemaker, and offset pressman. To discover the tasks and functions required for these job categories, a list of graphic arts industries in Iowa was developed, graphic arts personnel in three cities were interviewed and, from that information, the major instruments used in the study were developed: (1) the Iowa graphic arts industry manpower study questionnnaire (857 sent), and (2) competency validation survey interviews (154 conducted). The study indicates that increased numbers of people should be prepared for production and management opportunities in Iowa graphic arts industries in the next few years with emphasis in the area of offset-lithography in order to meet the employment requirements for the large number of small Iowa graphic arts industries. Appended are: (1) DOT (Dictionary of Occupation Titles) job descriptions, (2) general descriptive information on respondents, and (3) task checklists and survey forms. (LJ)

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IDENTIFICATION OF TASKS IN PHOTO-OFFSET LITHOGRAPHY OCCUPATIONS

Developed by the Department of Industrial Arts and Technology in cooperation with the Iowa Department of Public Instruction under a research project funded by Part C, P.L. 90-576

1975

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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FOREWORD

This research project was one of a series of projects designed to provide data pertaining to performance tasks in specific occupations in various areas of Vocational-Technical Education. These data may be used in developing appropriate objectives and curricular content for the preparation of individuals to enter the specific occupations studied.

The specific photo-offset lithography occupations studied in this investigation include lay-out man, paste-up man, Lithographic cameraman, stripper, platemaker and offset press man. The functions and tasks required for these job categories are identified and rated according to frequency in this report.

Data related to other task identification studies are available from the State Director, Career Education Division, Department of Public Instruction, Grimes State Office Building, Des Moines, Iowa 50319.

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JUSTIFICATION FOR THE TASK ANALYSIS

The printing industry is one of the largest industries in the United States. It ranks seventh in total payroll among all industries, and its more than 40,000 plants help it rank eighth in terms of manufactured product value.[1]

There are six major processes in the printing industry with offset lithography rapidly becoming the dominant process. In a 1973 study conducted by Eastman Kodak Company, 71 percent of the companies surveyed used the offset-lithography process and more than half of these companies devoted more than 80 percent of their production time to the process.[2]

This same national Kodak study made several recommendations which relate specifically to graphic arts education programs. One of the general recommendations for education was:

> New people in increased numbers should be prepared for production and managerial opportunities in the graphic communications industries of the 1970's. While all types of printing should be explored, schools should place special emphasis on developing people for employment in in-plant and general commercial areas, with equally special emphasis on the offset lithographic process.[3]

In the Kodak study, 66 percent of the respondents to the survey of printers ranked the shortage of qualified applicants as the primary problem in hiring both skilled and management personnel.[4] A review of other

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[1]George Reinfeld, Jr., Opportunities in Graphic Communications, (New York: Universal Publishing and Distributing Corporation, 1971), p. 9.

[2]Eastman Kodak Company, Complete Report - Kodak Graphic Arts Industry Manpower Study, (Rochester: Eastman Kodak Company, 1973), p. 53.

[3]Eastman Kodak Company, Manpower for Graphic Communications ... A Time for Change, (Rochester: Eastman Kodak Company, 1973), p. 5.

[4]Ibid.

literature relating to manpower needs in graphic arts bears out the fact of the increasing utilization of the offset-lithography process and the subsequent need for more trained lithographic craftsmen.[5]

The following recommendation from the Kodak study indicates the specific areas which Graphic Arts Education programs must emphasize if we are to meet manpower needs in graphic arts.

> Graphic arts programs at all levels must shift their emphasis to the areas of layout and design, photo composition, paste-up and copy preparation, camerawork, stripping, offset platemaking, sheet-fed offset presswork, bindery, and finishing. Any continued emphasis on the development of understanding and skill in letter press printing is not consistent with contemporary needs of this industry.[6]

Even though offset-lithography is one of the fastest growing areas in the graphic arts field, limited opportunities are available in Iowa educational institutions to educate potential employees for this field of work. There are presently only five high schools and post-secondary schools which offer graphic arts as a part of their curriculum, with very limited instruction in this field at the university level for teacher preparation.

The objectives of this study were: (1) to identify the major occupations in photo-offset lithography; (2) to identify the major tasks performed by employees in selected occupations within the broad photo-offset lithography cluster; (3) to determine the frequency with which each of the tasks were performed by workers; and (4) to identify the basic trends and problems of the graphic arts industry in Iowa.

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[5] United States Bureau of Labor Statistics, America's Industrial and Occupational Manpower Requirements 1964-1975, (Washington: Government Printing Office, 1966), p. 522.

[6] Eastman Kodak Company, Manpower for Graphic Communications...A Time for Change, (Rochester: Eastman Kodak Company, 1973), p. 6.

METHOD OF PROCEDURE

Identification of Iowa Graphic Arts Industries

A comprehensive list of graphic arts industries in Iowa was not available and had to be developed from the following sources: (1) Directory of Iowa Manufacturers; (2) Yellow Pages of Iowa Telephone Directories; and (3) a partial list provided by the Printing Pressman's Union. The compiled list contained the names of 857 companies which had production and/or sales activity in some area of graphic arts.

Development of Instruments

Job Analysis Schedule Questionnaire

Some general information was needed in order to develop the major questionnaires to be used in the study. A limited number of job analysis schedules were completed by personal interview with graphic arts personnel in industries in the cities of Cedar Falls-Waterloo, Cedar Rapids and Des Moines. The items included were: (1) company job title; (2) alternate titles; (3) DOT title; (4) type of printing establishment; (5) job description; (6) work performance; (7) worker companies; (8) educational background; (9) vocational preparation; (10) previous job experience; (11) apprenticeship training; (12) in-plant training; (13) on-the-job training; (14) affiliation with printer's craft union; (15) physical requirements and limitations; and (16) specific job tasks. Information obtained from this instrument was used to develop the major instruments used in this study.

Iowa Graphic Arts Industry Manpower Study Questionnaire

The manpower study questionnaire was sent to the 857 companies which had been identified earlier as having production and/or sales activity in graphic arts. Items included in the questionnaire were: (1) percent of production time by major industry classification; (2) percent of production time by printing process; (3) number of skilled occupational personnel; (4) union affiliation; (5) problems in the employment of skilled personnel; (6) problems in the retention of skilled personnel; (7) desirable characteristics in the retention of personnel; (8) occupational titles used; (9) number of personnel employed in each occupation; (10) desired educational level of employees; (11) preferred source of skilled employees; and (12) new or replacement personnel needed.

Competency Validation Instruments

The competency validation instruments were developed from information obtained from the Job Analysis Schedule, The Iowa Graphic Arts Industry Manpower Study Questionnaire and the Dictionary of Occupational Titles. (See Appendix A). Instruments were developed for the six major occupational classifications of: (1) Lay-out man; (2) Paste-up man; (3) Lithographic cameraman; (4) Stripper; (5) Platemaker; and (6) Offset press man. It was obvious from the information that although these are specific occupational titles in large plants that one man in a small plant might perform all the tasks included in all six classifications. Items included on each instrument were: (1) task frequency; (2) educational level: (3) occupational training; (4) time spent in occupational training programs; (5) number of years employed; (6) union membership; and (7) frequency of tool use.

The information for the competency validation instrument was obtained by the personal interview technique. The number of personnel interviewed in each occupation is shown in Table 1.

TABLE 1

COMPETENCY VALIDATION SURVEY INTERVIEWS

Job Classification	No. of Personnel Interviewed
Lay-out Man	18
Paste-up Man	22
Lithographic Cameraman	21
Stripper	23
Platemaker	23
Platemaker	23
Offset Press Man	24

The competency validation instrument was pre-tested with two or three employees in each job classification and then revised prior to actual use. Actual instrument interviews were conducted in the three major metropolitan areas of Cedar Falls-Waterloo, Cedar Rapids and Des Moines. Personnel from a representative sample of large, medium and small plants were selected for the actual Competency Validation Survey.

A five point discrimination scale was used for the study to correspond to other task inventory research being conducted in cooperation with the Iowa Department of Public Instruction. Each competency or task was checked by employees to indicate if the task was done daily, weekly, monthly, yearly or never.

Please refer to Appendix C for copies of survey instruments.

ANALYSIS OF DATA

Iowa Graphic Arts Industry Manpower Study

A total of one hundred seventy-four completed questionnaires and approximately two hundred uncompleted questionnaires were returned. The uncompleted questionnaires had explanations attached such as: "Sales office only"; "No longer in business"; "Duplicate copy - do business under two names"; and, "Send out actual printing." It was impossible to determine exactly how many graphic arts plants exist in Iowa but it is considerably less than the 857 plants included on the comprehensive list compiled at the beginning of the study.

Size of Plants

It was found that of all respondents to the study, 70 percent employed one through nine people, 19 percent employed 10 through 25 people, and 11 percent employed 26 or more. This information confirms that over two-thirds of the Iowa printing industry is made up of small plants. (See Table 2).

TABLE 2

SIZE OF IOWA GRAPHIC ARTS PLANTS

No. of Skilled Personnel	Percent of Respondents
1 - 9	70%
10 -25	19%
26 and up	11%

Major Industry Classifications

Table 3 shows that the majority of companies responding to the study were engaged only in commercial printing. The second highest category was newspaper and commercial printing. Other major industry classifications with the percent of companies reporting are also shown.

TABLE 3

PERCENT OF COMPANIES REPORTING BY MAJOR INDUSTRY CLASSIFICATION

Industry Classification	Percent of Companies Reporting Classification
In-Plant (Captive)	15%
General Commercial	63%
Newspaper and Commercial	30%
Trade Plant	15%
Book Publications	12%
Business Forms	29%
Greeting Cards	5%
Packaging	8%
Other	7%

Production by Printing Process

When asked to respond to the type of printing process used, 88% of the respondents indicated doing offset-lithography while 70% indicated doing some letterpress work. Only a small percent of the respondents were involved in other types of printing processes as shown in Table 4.

TABLE 4

PRODUCTION BY PRINTING PROCESS

Printing Process	Percent of Companies Reporting
Offset-Lithography	88%
Letterpress	70%
Gravure	3%
Screen	1%
Flexography	3%
Letterset	2%
Electrostatic	2%
Other	6%

Respondents were also asked to indicate the change in use of the various printing processes. Table 5 shows the increasing use of the offset-lithography process and the decreasing use of the letter press process. These figures correspond very closely with the national statistics reported in the Kodak study.[7]

TABLE 5

PERCENT OF CHANGE IN USE
OF PRINTING PROCESSES

Printing Process	Percent of Companies Reporting		
	Increase	Decrease	No Change
Offset Lithography	71%	2%	27%
Letterpress	14%	51%	35%

Union Affiliation

Over four-fifths of the respondents indicated (see Table 6) the skilled occupations in their plants were all non-union. This may be due primarily to the large number of small graphic arts industries in Iowa that employ less than ten skilled occupational personnel.

TABLE 6

UNION AFFILIATION

Category	Percent
All union	6%
Union and non-union	11%
All non-union	83%

Problems in Employment of Skilled Occupational Personnel

Respondents ranked the shortage of qualified applicants (see Table 7) as the primary problem in employment of skilled occupational personnel in

[7]Eastman Kodak Company, Manpower for Graphic Communications...A Time for Change, (Rochester: Eastman Kodak Company, 1973), p. 6.

offset-lithography with poor trade knowledge and skill as the secondary problem.

TABLE 7

PROBLEMS IN EMPLOYMENT OF PERSONNEL

Problem	Percent Indicating Primary Problem
Shortage of qualified applicants	64%
Poor trade knowledge and skill	29%
Inadequate wage scale	7%

Problems in Retention of Skilled Occupational Personnel

The primary problems in the retention of skilled occupational personnel in offset-lithography were identified as poor work habits and attitudes and inadequate wage scale and advancement opportunities. Inability to adapt to training and inability to get along with fellow employees were also problems as indicated in Table 8.

TABLE 8

PROBLEMS IN RETENTION OF PERSONNEL

Problem	Percent Indicating Primary Problem
Inability to adapt to retraining	17%
Inability to get along with fellow employees	6%
Inadequate wage scale and advancement opportunities	36%
Poor work habits and attitudes	41%

Desirable Characteristics in Retention of Personnel

Attitude was ranked by almost half the respondents as the most important desirable characteristic in the retention of personnel in offset-

lithography. Ambition and initiative, ability to communicate, and dependability also received a number of one rankings. (See Table 9).

TABLE 9

DESIRABLE CHARACTERISTICS IN THE RETENTION OF PERSONNEL

Desirable Characteristics	Percent Indicating Primary Importance
Ability to get along with people	6%
Ability to communicate	10%
Promotion Potential	6%
Attitude and work habits	43%
Ambition and initiative	20%
Dependability	15%

Offset Lithography Occupational Titles

A review of literature and the initial job analysis questionnaire revealed a wide variety of occupational titles in use in offset-lithography plants. The titles which were finally selected for use on the Iowa Graphic Arts Industry Manpower Study were production supervisor, copywriter, commercial artist, lay-out man, linotype operator, hand compositor, monotype keyboard operator, typesetting machine tender, imposer, proof pressman, photocomposing perforator operator, photocomposing machine operator, phototypesetting operator, compositor, proofreader, paste-up man, lithographic cameraman, process artist, contact-frame operator, stripper, plate maker, offset duplication machine operator, offset press man, cutting machine operator, folding machine operator, and stitching machine operator. The only new occupational titles added by the respondents were "darkroom technician," added by one respondent, and "justowriter operator," added by one respondent.

Personnel Employed in Each Occupation

It was obvious from the variety of responses that a consensus does not exist in regard to occupational titles used by Iowa graphic arts industries. Table 10 shows the percentage of total personnel employed by production area as well as by occupational title within each production area.

The large number of small printing plants in Iowa complicated the data because many plants employ only one or two skilled personnel who actually complete the tasks in all production areas.

Desired Educational Level of Employees

The majority of respondents indicated that high school or area vocational school was the desired educational level of employees in all production areas. The only production area where any significant number of respondents indicated that college or university education is desirable was the area of layout and design. Thirty-two percent of the respondents indicated that college or university education was desired in occupations in layout and design. (See Table 11).

TABLE 10

PERSONNEL EMPLOYED IN EACH OCCUPATION

Production Area	Occupational Title	Percent Employed By Area	Percent Employed By Title In Area
Layout and Design		16%	
	Production Supervisor		36%
	Copywriter		9%
	Commercial Artist		17%
	Layout Man		38%
Composition and Paste-up		37%	
	Linotype Operator		3%
	Hand Compositor		3%
	Monotype Keyboard Operator		1%
	Typesetting Machine Tender		1%
	Imposer		1%
	Photocomposing Perforator Operator		18%
	Photocomposing Machine Operator		15%
	Phototypesetting Operator		8%
	Compositor		11%
	Proofreader		15%
	Paste-up Man		22%
	Justowriter Operator		1%
Camerawork and Stripping		16%	
	Lithographic Cameraman		40%
	Process Artist		4%
	Contact-frame Operator		9%
	Stripper		45%
	Darkroom Technician		2%
Platemaking		6%	
	Plate Maker		100%
Press Operation		11%	
	Offset Duplication Machine Operator		41%
	Offset Press Man		59%
Finishing and Binding		14%	
	Cutting Machine Operator		39%
	Folding Machine Operator		28%
	Stitching Machine Operator		33%

TABLE 11

DESIRED EDUCATIONAL LEVEL OF EMPLOYEES

Production Area	Less Than High School	High School	Area Voc. School	College or University
Layout and Design	0%	40%	28%	32%
Composition and Paste-up	0%	58%	36%	6%
Camerawork and Stripping	3%	45%	52%	0%
Platemaking	7%	60%	33%	0%
Press Operation	0%	37%	63%	0%
Finishing and Binding	7%	40%	53%	0%

Preferred Source of Skilled Employees

The preferred source by respondents for skilled personnel in all production areas except press operation was other companies. In the area of press operation, the preferred source was area vocational schools. In-service training programs as a write-in "other" source ranked significantly high in all categories. (See Table 12).

TABLE 12

PREFERRED SOURCE OF SKILLED EMPLOYEES

Production Area	Other Companies	Area Voc. Schools	Union Apprent.	College or University	In-Service
Layout and Design	41%	13%	3%	30%	13%
Composition and Paste-up	38%	28%	1%	1%	32%
Camerawork & Stripping	50%	29%	0%	0%	21%
Platemaking	44%	25%	0%	0%	31%
Press Operation	32%	47%	0%	0%	21%
Finishing and Binding	53%	31%	0%	0%	16%

Replacement Personnel

Response data indicated that over half of the new or replacement skilled occupational personnel needed in the next five years will be in the production areas of composition and paste-up and press operation. Camerawork

and stripping accounted for 15% of personnel needs while needs in other production areas were 13% or less.

TABLE 13

REPLACEMENT PERSONNEL

Production Area	Percent of Total Personnel Needs
Layout and Design	13%
Composition and Paste-up	33%
Camerawork and Stripping	15%
Platemaking	5%
Press Operation	24%
Finishing and Binding	10%

Competency Validation Data

Based on the Job Analysis Schedule for Photo-offset Lithographic Occupations, a review of literature including the Dictionary of Occupational Titles, and the data from the Iowa Graphic Arts Industry Manpower Study, competency validation was limited to six specific skilled occupations within the photo-offset lithography industry. These six skilled occupations are representative of all production areas within offset-lithography except the area of finishing and binding. This production area was not included in the study because many of the tasks performed do not require a high degree of skill and also because of the diverse nature of the job requirements in this area in different industries.

Tables 14 through 19 each contain tasks which are listed in the order or sequence of their performance on the job. The performance rate is designated by letters which represent a range or mean frequency score for the tasks. An A is used to indicate a task with a mean frequency score above 4.0; B indicates a task with a mean frequency score between 3.0 - 3.9; C indicates a task with a mean frequency score between 2.0 - 2.9; and D indicates a task with a mean frequency score of 1.9 or less. Since the coded response pattern was such that a 4.0 was marked if the task was performed at least once a week, all items with a mean frequency above 4.0 were interpreted as being tasks performed several times a week and were indicated by A. Similarly, since a 3.0 indicates a task performed at least once a month and a 2.0 at least once a year, a B suggests tasks that are performed several times a month; a C several times a year; and a D less than once a year.

TABLE 14

TASKS PERFORMED BY LAY-OUT MEN

Task[a] (Arranged in Order of Performance)	Performance Rate of Tasks[b]	Mean Frequency Scores[c]
1. Meeting with customers to discuss job requirements, approximate costs and layout possibilities.	A	4.35
2. Preparing of thumbnail, rough and comprehensive layouts.	A	4.00
3. Apportioning of space and positioning of photographs and illustrations on layout.	A	4.53
4. Determining sizes of illustrations to be used.	A	4.82
5. Recommending type styles and sizes to be used.	A	4.65
6. Recommending paper stock to be used.	B	3.24
7. Directing activities of art personnel in preparation of drawings, cartoons and similar materials.	B	3.81
8. Selecting of clip-art to be used.	C	2.88
9. Directing activities of photographer in taking of photographs.	C	2.29
10. Marking up layouts for composing personnel.	A	4.06
11. Writing of material for printing jobs.	D	1.63
12. Proofreading of composed copy.	B	3.60
13. Meeting with customer to discuss proofs of paste-up and to obtain final approval for printing.	A	4.06
14. Organizing of previous job samples for promotional use.	C	2.82
15. Maintaining of schedule for job progression and completion.	A	4.53

[a]Other write-in tasks by respondents included: preparing finished art and illustrations; doing paste-up; sales; supervision of plant maintenance; and making dummys of larger jobs.

[b]An A indicates a task which is performed several times a week; B a task which is performed several times a month; C a task which is performed several times a year; and D a task which is performed less than once a year.

[c]Mean score with the following values assigned to frequency of use: 5 - daily; 4 - weekly; 3 - monthly; 2 - yearly; and 1 - never.

TABLE 15

TASKS PERFORMED BY PASTE-UP MEN

Task[a] (Arranged in Order of Performance)	Performance Rate of Tasks	Mean Frequency Scores
1. Cropping of photographs using marginal or overlay method.	A	4.50
2. Scaling copy for cameraman using a proportion scale.	A	4.73
3. Making lines on mechanical paste-up using ruling pens.	A	4.50
4. Making designs or improving copy with a croquill pen.	B	3.55
5. Using rubber cement for mounting materials.	B	3.68
6. Using waxing machine for mounting materials.	B	3.48
7. Making a composite by combining the images from two separate photographs.	C	2.50
8. Producing hand lettering for use in paste-up mechanicals.	C	2.18
9. Using pasteup lettering in paste-up mechanicals.	A	4.00
10. Making photocopies or photostats of either halftone or line work.	C	2.86
11. Using photocopies or photostats as copy on mechanicals.	A	4.36
12. Retouching of linework with ruling pen, retouch grays, lampblack or poster white.	A	4.05
13. Retouching of photographs with airbrush, sable brush with water color, or sharp blade.	C	2.00
14. Making multiple color paste-ups using transparent overlay sheets.	B	3.50
15. Lubricating, maintaining and minor repairing of tools and equipment.	B	3.77
16. Writing of instructions for cameraman.	A	4.64

[a]Other write-in tasks by respondents included: cutting overlays; drop-outs; use of screens, rubylith, zip-a-tone, and format rule; preparing original artwork; and typesetting with strike-on or photo-set machines.

TABLE 16

TASKS PERFORMED BY LITHOGRAPHIC CAMERAMEN

Task[a] (Arranged in Order of Performance)	Performance Rate of Tasks	Mean Frequency Scores
1. Mixing chemicals using graduates, beakers, and stirrers to prepare liquid solutions to manufacturers specifications.	A	4.37
2. Producing line negatives with process camera for single color reproduction.	A	5.00
3. Producing line negatives with process camera for multiple color reproduction.	A	4.38
4. Producing halftone negatives with process camera and contact screen for single color reproduction.	A	4.52
5. Producing halftone negatives with process camera and contact screen for duotone reproduction.	B	3.52
6. Producing halftone negatives with process camera and autoscreen ortho film.	D	1.86
7. Producing halftone separation negatives by direct method for process color reproduction.	D	1.48
8. Producing halftone separation negatives by indirect method for process color reproduction.	D	1.55
9. Producing color key proofs with either 3M color key or 3M transfer-key color proofing systems.	B	3.52
10. Producing line film positives from line film negatives, or vice versa, using contact printer.	A	4.38
11. Producing continuous tone film positives from continuous tone film negatives, or vice versa, using contact printer.	D	1.95
12. Producing paper prints from film positives or film negatives using contact printer.	A	4.05
13. Producing paper prints from film negatives or positives using photo-stabilization processor.	C	2.62

(more)

TABLE 16 (continued)

TASKS PERFORMED BY LITHOGRAPHIC CAMERAMEN

	Task[a] (Arranged in Order of Performance)	Performance Rate of Tasks	Mean Frequency Scores
14.	Producing film negatives or positives from camera copy other than usual black ink on white paper using combinations of filters and film.	A	4.10
15.	Maintaining, lubricating and minor repairing of equipment.	B	3.89
16.	Major repairing of equipment.	D	1.97

[a]Other write-in tasks by respondents included: posturization; and rubylith overlays.

TABLE 17

TASKS PERFORMED BY STRIPPERS

	Task (Arranged in Order of Performance)	Performance Rate of Tasks	Mean Frequency Scores
1.	Opaquing line negatives on light table using a brush and opaque solution to block out unnecessary light sources.	A	5.00
2.	Strengthening a positive with a croquill pen opaque all light spots.	C	2.83
3.	Improving positives or negatives with a scriber or litho needle to remove undesirable images.	A	4.70
4.	Scribing uniform width lines on positives or negatives using litho needle and straightedge.	B	3.87
5.	Laying out and stripping flats for single color negative, positive, halftone or combination single page jobs.	A	5.00
6.	Laying out and stripping flats for single page multiple color jobs.	A	4.70
7.	Laying out and stripping flats for step-and-repeat jobs.	A	4.70
8.	Laying out and stripping single flat for multiple page reproduction.	A	4.78
9.	Laying out and stripping flats for booklet dummy of signature imposition.	A	4.74
10.	Using precision layout table with vernier spacing mechanism to lay out and strip flats.	C	2.71
11.	Laying out and stripping flats for color process reproduction.	B	3.61
12.	Laying out and stripping negatives and positives on a transparent plastic film base.	B	3.65
13.	Exposing and processing of proofs of flats (blue line, 3M color key, etc.).	A	4.43
14.	Coding flats for color, printing sequence, number of burns, etc.	A	4.50
15.	Maintaining, lubricating and repairing of equipment.	B	3.30

TABLE 18

TASKS PERFORMED BY PLATEMAKERS

Tasks[a] (Arranged in Order of Performance)	Performance Rate of Tasks	Mean Frequency Scores
1. Coating (with deep etch coating solution horizontal whirler), exposing and developing of zinc, bimetal or trimetal plates.	D	1.70
2. Exposing and developing pre-sensitized paper plates using arc lights and vacuum frame.	C	2.18
3. Exposing and developing pre-sensitized aluminum plates using arc lights and vacuum frame.	A	4.78
4. Exposure and development of photo-direct pre-sensitized plates using automatic camera or projector-type platemaker.	D	1.62
5. Operation of automated equipment for exposing, developing, rinsing, gumming, and drying of plates.	D	1.57
6. Making corrections, additions or deletions to plates after development.	B	3.87
7. Exposing and developing of plates from step-and-repeat flats.	A	4.09
8. Exposing and developing of plates for color process jobs.	B	3.74
9. Applying preservative to plates.	A	5.00
10. Maintaining, lubricating and minor repairing of equipment.	A	4.13
11. Major repairing of equipment.	D	1.52

[a]Other write-in tasks by respondents included: exposure of instant image proof paper; exposure, development and registration of 4-color proofs; making step and repeat layouts; and mixing chemicals.

TABLE 19

TASKS PERFORMED BY OFFSET PRESSMEN

	Tasks (Arranged in Order of Performance)	Performance Rate of Tasks	Mean Frequency Scores
1.	Setting up, adjusting and operating a sheet fed, single color offset press.	A	4.55
2.	Setting up, adjusting and operating a sheet fed, multiple color offset press.	A	3.25
3.	Setting up, adjusting and operating a web fed, single color offset press.	D	1.18
4.	Setting up, adjusting and operating a web fed, multiple color offset press.	D	1.19
5.	Lubricating, maintaining and minor repairing of an offset press.	A	4.67
6.	Major repair of an offset press.	C	2.00
7.	Mixing of inks according to formula or color matching.	A	4.58
8.	Printing of multiple color jobs.	A	4.63
9.	Printing of color process jobs.	B	3.33
10.	Washing up the offset press.	A	5.00
11.	Cleaning and applying preservative to offset plates.	A	4.92
12.	Storing of offset plates.	A	4.13
13.	Taking inventory of paper stock.	C	1.83

Frequency of Tool and Equipment Use

Table 20 shows the frequency of use for selected photo-offset lithography tools and equipment. Since about one-third of the respondents were from small graphic arts industries and actually worked in two or more of the job classifications it may have been difficult for them to separate the use of tools by job category. This may account for the lack of a clear distinction between tools and equipment used and job classifications.

TABLE 20

FREQUENCY OF TOOL AND EQUIPMENT USE[a]

Tool	Lay-out Man	Paste-up Man	Litho.Cameraman	Stripper	Platemaker	Offset Pressman
Artist Brushes	3.83	4.32	3.00	4.43	3.25	1.33
T-square	4.54	4.56	3.54	4.73	3.38	2.00
Scales	3.64	3.82	2.36	3.08	1.92	2.47
Triangles	4.69	4.84	2.69	4.53	2.58	1.53
Drawing Board	3.85	3.89	1.64	2.08	1.18	1.73
Knife	4.85	5.00	4.38	5.00	4.17	3.00
Light Table	3.92	4.47	4.43	5.00	4.38	4.38
Paper Trimmer	3.20	3.94	3.92	3.86	2.46	1.88
Waxing Machine	3.33	3.63	2.08	1.69	1.00	1.31
Ruling Pens	3.85	4.68	2.69	2.43	2.23	1.56
Varityper	1.58	2.18	1.00	1.00	1.67	1.00
IBM Composer	1.25	1.31	1.00	1.00	1.00	1.00
Proportion Calculator	4.50	4.33	4.77	3.79	2.18	1.63
Photo Lettering Machine	1.85	2.06	1.00	1.00	1.00	1.00
Air Brush	1.62	1.47	1.00	1.00	1.45	1.00
Chemical Mixer	1.00	1.19	2.08	1.83	2.00	1.82
Graduates, Beakers,& Stirrers	1.54	1.31	4.58	3.15	3.45	3.00
Color Analyzer	2.00	1.25	1.33	1.00	1.00	1.27
Densitometer	1.69	1.00	2.71	2.38	1.55	3.47
Magnifying Glass	4.25	3.19	5.00	5.00	4.93	4.90
Developing Trays	1.65	1.63	4.07	2.46	2.46	1.38
Temperature Controlled Sink	1.25	1.25	2.21	1.85	3.23	1.25
Color Filters	1.42	1.31	3.87	1.92	1.54	1.69
Balance Scales	2.08	1.38	1.15	1.00	1.50	2.67
Thermometers	1.50	1.13	4.62	2.46	2.85	1.25
Print Dryer	1.33	1.47	2.64	1.67	1.54	1.27
Film Dryer	1.33	1.31	3.00	2.17	1.69	1.06
Direct Transfer Processor	1.58	1.50	2.07	1.54	1.00	1.00
Color Enlarger System	1.00	1.00	1.00	1.00	1.00	1.00
Enlarging Easel	1.67	1.19	1.08	1.00	1.00	1.00
Opaquing Brush	3.17	3.38	4.69	5.00	4.57	1.81
Croquill Pen	1.50	2.44	1.58	2.50	1.25	1.25
Dot Etch Table	1.25	1.00	2.23	1.27	1.25	1.00
Litho Needle	1.92	1.13	2.85	3.86	3.85	2.44
Scriber	2.15	2.25	3.15	4.46	3.17	2.65
Horizontal Whirler	1.00	1.00	1.00	1.00	1.67	1.00
Vacuum Frame	1.50	1.69	4.71	4.73	4.00	2.19
Safelights	1.55	2.00	4.73	4.00	3.71	1.38
Arc Lamps	1.58	1.63	4.07	4.36	5.00	1.94
Timers	1.83	1.94	5.00	4.40	5.00	2.00
Micrometers	1.42	1.25	1.58	1.33	2.18	4.06
Platemaking Machine	1.33	1.94	3.46	3.08	3.40	2.13
Ink Knife	1.42	1.59	1.92	1.33	1.33	5.00
Power Ink Mixer	1.00	1.00	1.31	1.17	1.17	2.06
Ink Matching Scale	1.92	1.75	2.31	2.17	1.50	4.63
Offset Duplicator	1.33	1.50	1.83	1.08	1.09	2.59
Sheet Fed Sing.Color Off.Pr.	1.33	1.50	1.33	1.33	1.33	4.25
Sheet Fed Multi-Col.Off.Pr.	1.33	1.25	1.00	1.33	1.33	3.78
Web Fed Offset Press	1.36	1.00	1.33	1.33	1.33	1.57
Guillotine Paper Cutter	1.42	1.75	1.83	1.58	1.42	2.27
Safety Cans (rags)	1.92	2.19	2.50	2.92	2.69	4.78
Safety Cans (solutions)	1.58	2.00	2.25	1.97	2.00	4.80

[a]Mean score with the following values assigned to frequency of use: 5-Daily; 4-Weekly; 3-Monthly; 2-Yearly; and 1-Never.

SUMMARY AND CONCLUSIONS

The following conclusions can be drawn from the findings of this study:

1. A large majority of the Iowa graphic arts industries employ less than ten skilled personnel.

2. A majority of the graphic arts industries in Iowa are engaged primarily in general commercial printing.

3. The use of the offset lithography process is presently used in over seventy-five percent of Iowa graphic arts industries with the letterpress process experiencing a continuing decline in use.

4. A large majority of graphic arts industries in Iowa are non-union.

5. The primary problem in the employment of personnel in Iowa graphic arts industries is the shortage of qualified applicants.

6. A wide variety of occupational titles are being used in graphic arts industries in Iowa with many personnel employed in small plants completing the tasks required in all production areas.

7. Almost forty percent of the individuals employed in Iowa graphic arts industries are in the production area of composition and paste-up.

8. The majority of Iowa graphic arts industries require a high school or area vocational school educational level for employment. Approximately thirty percent indicated that college or university training was desirable in the area of layout and design.

9. Graphic arts industries seek skilled personnel from Iowa area vocational schools in the area of press operation more than in any other production area.

10. The majority of the skilled occupational personnel needed in the next five years by Iowa graphic arts industries will be in the production areas of composition and paste-up and press operation.

This study seems to indicate that increased numbers of new people should be prepared for production and management opportunities in Iowa graphic arts industries in the next few years. Emphasis should be placed on occupations in the area of offset-lithography with training in occupational clusters to meet employment requirements for the large number of small Iowa graphic arts industries.

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APPENDIX A: DOT JOB DESCRIPTIONS

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Occupational Titles:

Production Superviser	979.138
Layout Man	141.081
Linotype Operator	650.582
Compositor	973.381
Monotype Keyboard Operator	650.582
Typesetting Machine Tender	650.885
Imposer	973.381
Proof Pressman	651.782
Photocomposing-machine Perforator Operator	208.588
Photocomposing Machine Operator	650.782
Phototypesetter Operator	650.582
Proofreader	209.688
Paste-up Man	979.381
Photographer, Lithographer	972.382
Process Artist	972.281
Contact-frame Operator	976.884
Stripper-photoengraver	971.381
Transferrer	972.381
Offset-duplicating-machine Operator	651.782
Offset-press Man	651.782
Cutting Machine Operator	649.782
Folding Machine Operator	653.782

Production Supervisor 979.138 (Supervisor, Layout) Confers with customers or editorial personnel to determine requirements and format of material to be printed, and supervises workers engaged in preparation and layout of material: Studies editorial matter to determine most effective form of presentation and number and type of illustrations required, in conformity with wishes of customer or editorial personnel and accepted standards of composition, limitations of equipment, and available funds. Prepares mock-up (dummy form) to show appearance of pages for use by other workers in setting type and making up pages. Marks copy to incorporate printing instructions and editorial changes, using standard printing symbols. Routes art work to reproduction department or outside contractor for retouching, photographing, and platemaking. Routes editorial material to composing room for typesetting. Reviews finished material for format, accuracy, and general appearance. Submits proofs for final review and routes corrected copy to pressroom for printing. May plan technical drawings to supplement copy. May be designated according to printing process employed as lithographic-copy preparer.

Lay-out Man 141.081 Plans page layouts of illustrative material, such as sketches, photographs, and diagrams, for use in preparing newspaper advertisements, books and technical manuals: Apportions space and roughly arranges positions for illustrations. Determines sizes of illustrations to be used to obtain maximum clarity and most desirable effect. Indicates positions of illustrative materials on layout by sketching appropriate lines. Marks worksheets with explanatory legends for letter-press printing. May select illustrations and direct activities of art personnel in preparing

drawings, cartoons, and similar materials to accompany printed copy, being designated supervisor, publications reproduction.

Linotype Operator 650.582 (Composing Machine Operator) Operates machine to cast complete lines of type from type metal and deposit them in galley in composed form for printing: Selects typecasting mechanism and adjusts marginal stops and gage to regulate length and thickness of lines to be cast. Reads copy and presses keys of keyboard to select matrices of letters from magazine which are assembled into words. Moves lever to cast line and deposit it in galley when line is complete. Transfers lines of type, with copy, to composing or bank table for making proof copy. Sets new lines of type to correct errors as indicated on proof sheet. Places pigs of metal on feed chain of melting pot to replenish supply.

Compositor 973.381 (Typesetter; Typographer) Sets type by hand and machine, and assembles type and cuts in a galley, for printing articles, headings and other printed matter, determining type size, style and compositional pattern from work order: Measures copy with line gauge to determine length of line. Sets composing stick to line length indicated on line gauge. Selects type from type case and sets it in compositional sequence, reading from copy. Inserts spacers between words or units to balance and justify lines. Transfers type from stick to galley when setup is complete. Inserts leads, slugs, or lines of quads between lines to adjust length of setup. Prepares proof copy of setup, using proof press. Examines proof for errors, corrects setup, and forwards it to imposing stone or bank. Cleans type after use and distributes it to specified boxes in type case. May set type to print copy that is unaccompanied by specifications, using knowledge

of composition and printing processes. May be designated as job compositer when setting type in commercial printing establishments or ad compositer when assembling types and cuts for display advertisements.

Monotype-keyboard Operator 650.582 (Composing Machine Operator; Monotype Operator) Operates machine to perforate paper tape used to control casting type: Clips copy, containing instructions, to copyholder. Selects and installs banks of keys to make specified size and style of type. Sets and locks scale for indicating spacing of words in line, adjusts line-length indicator, and installs roll of paper strip, threading end of strip through machine. Admits compressed air to machine. Tears strip loose from supply roll, attaches type-casting instructions to reel, and forwards reel for casting type.

Typesetting Machine Tender 650-885 (Teletypsetter Monitor) Tends and adjusts one or more linotype machines, equipped with teletypesetter operating unit to produce automatic type composition: Positions spool of punched tape on machine reel. Threads end of tape through feed mechanism of teletype-setter unit. Turns control to start unit that sets type automatically as directed by coded signal on punched tape. Observes operation of machine to detect malfunction of keyboad and matrix circulation, tape feeding, or other machine mechanisms, and adjusts their mechanical components, using handtools, or depressing keys on keyboard manually to clear jamming. May replace worn parts, such as code bars, keys, and spacebands, using handtools and power tools.

Imposer 973.381 (Lock-up Man; Stonehand; Stoneman) Arranges pages of type or forms in positional patterns in chase frame according to dummy

sheet or stone lay diagram: Places type pages in position in chase so that pages will be printed on sheet in correct order for folding and trimming. Inserts spacing material at top, bottom, and sides of pages to provide balanced margins. Checks alinement of positioned pages with ruler to produce exact register with printing on reverse side of page. Inserts or removes spacing material as required, to achieve uniformity in page dimensions. Examines type matter for balanced spacing. Inserts quoins and locks type pages in chase. Planes type forms to level printing surface. Arranges pages of type in position for an entire book, newspaper, pamphlet, or magazine.

Proof-Pressman 651.782 (Galley Boy; Imprinting-maching Operator; Proof Boy; Proofer) Operates proof press to make proofs of type setup: Places galley of type on bed of press. Depresses pedal to move ink roller over face of type or applies ink, using hand roller. Places sheet of paper on type and depresses pedal or turns crank to pass rollers over paper to obtain proof of type setup. Removes proofsheet from press and delivers it to proofreader. Lithographic Proofer - operates press to make proof of lithographic plates to determine quality of color and tone values, using knowledge of ink color blending, paper composition, and lithographic printing processes. Offset-proof-press Operator - makes ready and operates proof press to test quality of offset-printing plates: Secures lithographic plate to press roller. Applies ink to plate with hand roller. Turns crank to rotate rubber-blanket roller against plate and over paper to transfer image to proof paper.

Photocomposing-machine Perforator Operator 208.588 Operates keyboard of automatic photocomposing perforator machine to copy data from manuscript onto tape used in photocomposing machine: Inserts paper tape in perforator. Clips copy in copy holder and starts perforator mechanism. Sets indexed dials to select length, type size, film feed, and type face specified on manuscript. Depresses keys of keyboard to select coded signals in paper tape to run photocomposing machine. Removes perforated tape from perforator.

Photocomposing-machine Operator 650.782 (Typesetter) Sets up and operates photocomposing machine to transfer data from perforated tape into print on film or photographic paper: Loads roll of film or paper in machine magazine. Secures roll of perforated tape on machine reel and threads end of tape through machine feed rollers. Selects type font according to size and face of type specified and positions it on photographic unit. Turns dials to adjust line spacing and intensity according to size and face of type. Starts machine that automatically prints type onto film or paper according to coded signal on tape. Removes finished copy from magazine for development.

Phototypesetter Operator 650.582 (Photosetter) Operates keyboard of automatic phototypesetting machine to photographically print type matter onto strips of photosensitive paper to prepare paper flats for making printing plates: Loads roll of photosensitive paper or film into camera magazine, positions magazine on machine, and pulls lever to open exposure slot. Starts typesetting mechanism. Turns dials to select lens and regulate gear train that controls size (magnification or reproduction) of matrix letter, exposure, and light intensity. Depresses keys of keyboard to select foto mats for printing onto photopaper. Cuts photopaper with knife to

separate exposed portion. Removes exposed photopaper or film from magazine for developing.

Proofreader 209.688 Reads typescript or proof of type setup to detect and mark for corrections any grammatical, typographical, or compositional errors, by either of the following methods: (1) Places proof and copy side by side on reading board. Reads proof against copy, marking by standardized code, errors that appear in proof. Returns marked proof for correction and later checks corrected proof against copy. (2) Reads and corrects proof while copy holder (clerical) reads aloud from original copy or reads proof aloud to copy holder (clerical) who calls out discrepancies between proof and copy.

Paste-up Man 979.381 Photographs prepared copy, develops negatives, and arranges and mounts illustrations and printed legends on paper according to artist's layout: Measures and marks paper according to artist's layout, customers instructions, or lay-out man's marks to determine position of illustrations and printed legend, using ruler and drafting instruments. Cuts illustrations, type matter, and various shapes of black construction paper from larger sheets, using knife or scissors, and fits them into allocated space or positions for spot emphasis and background. Prepares type headings to specified size and style, using bench-type photolettering machine. Photographs illustrations directly onto paper, reducing or enlarging image, using automatic focusing studio camera. Develops and fixes photographs and headings and drys them on heated drum drier. Draws in borders, blocks, leads, lines, outlines, and emphasis marks, using draftsmen's tools, pen, and ink. May mark order, copy, illustrations, and layout sheet with

illustrations.

Photographer, Lithographic 972.382 (Cameraman; Copy Cameraman; Lithographic-camera Man; Photographer, Stone; Photographer, Wet-plate; Photolithographer; Photolithographic Process Man; Process Man) Sets up and operates camera to photograph illustrations and printed material to produce film or glass negatives, or reversed negatives used in the preparation of lithographic printing plates: Mounts material to be photographed on copy board and focuses camera to enlarge or reduce size of object to photograph. Selects and places screen over negative to break up shadings in object for halftone printing. Places color filters over film to produce four-color separation, halftone separation, and process prints for multicolor printing. Focuses lens, adjusts lights, and exposes film to copy for specified period of time. Develops and dries film or glass plate. Prepares film or glass plate positives by contact method from negatives. May prepare original layouts for halftone or color prints by copy-drawing, paste-up, stripping, or inking techniques.

Process Artist 972.281 (Lithographic-color-artist Retoucher; Submarine Artist; Tone Artist) Changes undesirable details of illustration copy which is to be reproduced by lithographic process: Compares negative or positive with original copy to determine color correction, silhouetting, or opaquing requirements. Prepares dye or other chemicals and intensifies or reduces unsatisfactory tone values in film or glass. Blanks out or changes shades of colors of details to make them less prominent. Adds detail or color, applying screen tints to photographic or lithographic press plates and drawing on them with crayons or pen and ink. Works in black and white or color on positive prints prepared by photographer, lithographic.

Contact-frame Operator 976.884 (Darkroom Man; Process Man) Controls contact printing frame to produce photographic film positives or negatives for transferring illustrations or designs to printing plates or roller: Studies original illustration or design and order sheet to determine intensity required for reproduced image, length of exposure, and screens required to break up tones and shadings, according to colors in design and etching requirements. Mounts negative over film in contact frame and starts compressor that creates vacuum in frame and presses negative against film. Exposes film to light through negative to transfer image from negative to film, producing positive film. Removes exposed film from frame and processes it through series of chemical and rinsing baths to develop, fix, and rinse positive film. Positions positive over film in contact frame, exposes film to light through positive, replaces positive with appropriate screen, and exposes film to light through screen to produce screened positive. Develops, fixes, and rinses screened positive. Examines developed films for exposure errors. Agitates film in chemical solution to etch out overexposed film. Discards under-exposed film. Hangs developed film on line to dry. When reproducing designs with flat or solid colors, places screen in contact frame with original negative to produce screened positive. Marks or punches register points on screened films, using straightedge, triangle, and scriber. When employed in offset-printing establishment, may be designated lithographic contact-frame operator.

Stripper-photoengraver 971.381 (Negative Turner) Strips (removes) developed photographic negative film from glass or film base and remounts it, in reversed position, on another glass plate for use in preparing photo-

engraving plate: Pours rubber solution and collodion over glass or film base to toughen negative. Dries base and cuts negative to size, using knife and straightedge. Immerses glass or film base in acid bath to loosen negative. Strips negative from base and remounts it, in reverse position, on glass plate. Rubs negative with blotter to remove excess water and to insure adhesion to plate. Strips color negatives, using layout or blueprint (transparent film with faint blue image) as guide to obtain register for colors. May spot pinholes and block out areas with opaque paint and artist's brush. May be designated according to type of negative stripped as stripper, black and white; stripper, color.

Transferrer 972.381 (Composer; Lithographic Press-plate Maker, Photomechanical; Plate Maker) Transfers positive or negative images to metal plates to make offset photolithographic printing plates, according to written or oral instructions, using liquid formulas, photocomposing machine, plate whirler, layout table, and measuring instruments: Mixes chemicals, using graduates, beakers, and stirrers, to prepare platemaking solutions, such as counter-etch, photosensitive coatings, developers, gum solutions, lacquers, developing inks, and desensitizing etches, according to formulas and metal used. Washes grained metal plate with running water or acid solution to remove dirt and grease. Pours counter etching solution over grained surface and spreads with cotton pad to prepare smooth surface on plate. Clamps plate on whirler disk, starts machine, and pours sensitizing solution onto center of whirling plate to coat surface evenly. Adjust controls to regulate whirling speed, drying temperature, and humidity. Exposes plate to positive or negative image under arc lamp to transfer image to plate, using

vacuum frame or photocomposing machine. Determines length of exposure according to density of negative or positive sensitivity of coating, temperature, humidity, and thickness of coating. Develops transferred image on plate to retain specified surface in accordance with process and metals used by washing with water and applying lacquers, developing inks, desensitizing etches, gum solutions and asphaltum. May perforate tape for operation of tape-controlled step-and-repeat (photocomposing) printing machine. May expose plates with nonautomatic step-an-repeat machines. May make proof plates as well as press plates.

Offset-duplicating-machine Operator 651.782 Operates machine to reproduce typewritten matter, drawings, graphs, and similar material by photo-offset process: Applies specified chemical agents to surface of printing plate and secures treated plate in machine. Moves controls to set machine for size and thickness of paper, to center printed impression, and to regulate flow of ink and speed of paper feed according to material to be reproduced. Cleans printing plates after use, using type cleaner or solvent, and applies gum solution to prevent deterioration. May operate auxiliary machines, such as collator, folding machine, stapler, and paper punching, cutting, and perforating machines. May operate copy camera to prepare negatives for offset plates. May operate enlarger, plate burner, and related equipment to prepare negatives and transfer them to printing plates.

Offset Press Man 651.782 (Lithographic Pressman; Offset Press Operator) Makes ready and operates offset printing press to print single and multicolor copy from lithographic plates, examining job order to determine press operating time, quantity to be printed, and stock specifications:

Washes plate to remove protective gum coating. Builds up back of plate with sheets of folio to raise plate to printing level. Installs plate with backing on plate cylinder and locks in position, using handtools. Applies folio to blanket cylinder to build up to diameter of plate cylinder. Fills ink fountains - adjusts space between blanket and impression cylinders according to thickness of paper stock. Adjusts controls to regulate moisture delivery to plate cylinder. Operates press to secure proof copy. Examines proof and adjusts press controls to obtain specific color registration. Starts press and completes production run. Removes and cleans plate and cylinders at end of run.

Cutting-machine Operator 649.782 Sets up and operates machine to cut paper stock preparatory to binding: Reviews specifications to determine page sequence, kind of fold and size of sheets. Measures from edge of page, using scale, and sets cutting guides, clamps, and knives to cut paper to prescribed dimensions, using wrench. Places stack of paper sheets on bed of machine, rolling or folding oversize stock as necessary. Fans edges of sheets to prevent adherence of pages. Aligns edges by tapping against paper guide, using hand or stick, to insure square, true edges. Pulls lever to activate knife and removes trimmings preparatory to next cut. Examines cut stock for trimming imperfections, such as ragged edges and incomplete cuts. Removes sheets from machine and stacks on skid. Lubricates machine, changes dull knives, and performs running repairs as needed.

Folding-machine Operator 653.782 (Folder, Machine) Operates machine that automatically folds and slits printed sheets into signatures for binding: Inserts sample sheet in machine and sets side guides to edge of sheet.

Adjusts conveyor blades or knurled rollers to feed sheet into folding rollers. Adjusts screws to regulate tension on creasing blades and folding rollers according to thickness of paper and size and number of folds specified. Sets slitting knives to slit sheets as specified. Stacks sheets to be folded on conveyor belt of automatic feed. Adjusts machine during production run as required. May operate two or more machines. May jog folded sheets and stack sheets for next operation.

APPENDIX B: GENERAL DESCRIPTIVE DATA ON RESPONDENTS

GENERAL DESCRIPTIVE DATA ON RESPONDENTS

Characteristic	Per Cent of Respondents					
	Lay-out Man	Paste-up Man	Litho. Cameraman	Stripper	Platemaker	Offset Pressman
A. Educational Level						
Elementary	--	--	--	--	--	--
Junior High School	--	--	--	--	--	9.5
High School	41.7	44.4	41.7	93.3	66.7	85.7
Two Years College	25.0	16.7	25.0	6.7	33.3	4.8
Four Years College	33.3	38.9	33.3	--	--	--
B. Occupational Training[2]						
High School Voc.	17.6	22.7	14.3	26.1	17.4	33.3
Area School Voc.	5.9	4.5	4.8	4.3	--	4.2
In-Plant Company	35.3	45.5	28.6	39.1	43.5	45.8
Union Apprenticeship	17.6	13.6	14.3	17.4	21.7	33.3
Industry Sponsored	17.6	4.5	14.3	8.7	13.0	4.2
Four-Year College	17.6	18.2	14.3	--	--	--
Other	--	9.1	--	--	--	--
C. Time Spent in Training						
6 Months	33.3	36.4	33.3	9.1	8.3	5.0
1 Year	--	9.1	--	--	16.7	10.0
2 Years	--	--	--	9.1	16.7	25.0
3 Years	22.2	18.2	22.2	--	16.7	15.0
4 Years	11.1	18.2	11.1	27.3	--	25.0
5 Years	22.2	--	22.2	9.1	--	5.0
More than 5 Years	11.1	18.2	11.1	45.5	41.7	15.0
D. Total Years Employed						
Less than 1 Year	8.3	5.9	8.3	--	23.1	--
2-3 Years	16.7	23.5	16.7	7.7	7.7	9.1
4-6 Years	16.7	23.5	16.7	15.4	7.7	18.2
7-10 Years	8.3	5.9	8.3	38.5	15.4	13.6
11-15 Years	--	11.8	--	7.7	7.7	27.3
More than 15 years	50.0	29.4	50.0	30.8	38.5	31.8
E. Status in Regard to Union Membership						
Not a Union Member	83.3	82.4	83.3	42.9	42.9	57.1
Union Member	16.7	17.6	16.7	57.1	57.1	42.9

[2]Some respondents checked more than one type, hence totals are not equal to 100%.

APPENDIX C: TASK CHECKLISTS AND SURVEY FORMS

SAMPLE COPY OF COVER LETTER

Mr. Jacob Berstein
Inland Printing Company
666 Lake Street
Cedar Rapids, Iowa

Dear Mr. Berstein:

Attached to this cover letter is a VALIDATION INSTRUMENT which a team of workers have compiled as part of a competency study on occupational preparation and training in the Photo-Offset Lightographic industries of Iowa. This study is being financially supported through funds from the State Department of Public Instruction and the University of Northern Iowa as a means of determining the stage of development and status of photo-Offset lithography in Iowa and the specific occupational classifications in the trade along with th eir detailed job tasks.

We are asking your cooperation in reading over the materials enclosed and asking each respective employee involved in the job title listed to look over the instrument involved in his or her particular job. Ask each to validate the existing information on the instrument as correctly describing the information asked or write in any modifications or changes as deemed necessary to better describe the description and tasks involved in that job classification. We ask that you give complete task descriptions and especially the frequency at which they are performed.

Enclosed is a stamped envelope addressed back to me which you can use to send back the completed validation instruments sent to you. We hope that by giving the validation instrument to the employee performing the specific job in question, we will get a true and valid response to our questions since he or she is performing that particular job. It also will relieve any one person from doing the whole job if you are one to receive a group of validation instruments on the various occupations.

Since I have a deadline date of March 15th to get this information pulled together, would you make an effort to return them to me completed by around March 1st to the 5th? If you will be interested in a copy of the results of this study after I turn it in to the Department of Public Instruction please indicate in the following blank your answer of _____yes_____no.

Thank you for your cooperation. Without your help, this study cannot be truly accurate and authoritative and we certainly hope that it will be of some value to you in your plant when it comes to hiring new personnel or rating your present job classifications.

Sincerely,

Dr. Russell G. Hansen, Assoc. Prof.

COMPETENCY STUDY RESEARCH PROJECT
Career Education Division
Department of Public Instruction

Department of Industrial Arts and Technology
University of Northern Iowa

JOB ANALYSIS SCHEDULE

for

Photo-Offset Lithographic Occupations

1. Company Job Title: _____
2. Alternate Titles: _____
3. D.O.T. Title: _____ Code Number
4. Commercial Printing _____ Newspaper Printing _____ (Check One)

(Confidential Information)

Company name _____

Address _____ *City* _____ *Zip* _____

Number of employees _____ *Volume Dollar Business* _____

Services rendered _____

5. JOB DESCRIPTION:

6. WORK PERFORMANCE AS RELATED TO WORKER'S JOB ACTIVITIES

Worker Functions	Data	People	Things

Industrial Assignment: _____

7. WORKER COMPETENCIES AS INDICATED BY EXAMINATIONS OR TEST BATTERIES:

a. _____

b. _____

c. _____

d. _____

e. _____

8. GENERAL EDUCATION BACKGROUND REQUIRED FOR JOB:

Check appropriate space)

a. Elementary (6th grade)_____
b. Junior High School (8th grade)_____
c. High School_____
d. College_____

(1) Courses required _____

9. VOCATIONAL PREPARATION :

a. High School Vocational Training:_____

(I) Number of years_____Courses_____

b. Area Vocational School:_____

(I) Number of years_____Courses_____

c. College:_____

(I) Major Study Field_____Courses_____

_____

10. PREVIOUS JOB EXPERIENCE:

a. _____

_____

11. APPRENTICESHIP TRAINING:

a. Apprenticeship course _____

(1) Length of training _____

12. IN-PLANT TRAINING:

a. Length of time required _____

b. Nature & content of training _____

_____

13. ON THE JOB TRAINING:

a. Length of time required _____

b. Instruction received from _____

14. AFFILIATION WITH PRINTER'S/CRAFT UNION:

a. Name of union _____

b. Required affiliation _____ Not required _____ (check one)

15. PHYSICAL REQUIREMENTS/LIMITATIONS:

a. _____

_____

16. SPECIFIC JOB TASKS:

UNIVERSITY OF NORTHERN IOWA · Cedar Falls, Iowa 50613

Department of
Industrial Arts and Technology

IOWA GRAPHIC ARTS INDUSTRY MANPOWER STUDY

Dear Sir:

The University of Northern Iowa Department of Industrial Arts and Technology is conducting a study to determine the manpower needs and specific occupational competencies required for personnel in selected areas of the Iowa graphic arts industry. The study is being financially supported with funds provided by the Iowa State Department of Public Instruction.

All graphic arts newspaper and commercial printing firms in Iowa are being asked to participate in this study. Results of the study will be made available to all participants.

We are asking your cooperation in completing the twelve questions on the enclosed questionnaire. All information received from companies will be considered confidential and only total compiled responses will be released in the results of the study. Please complete and return the enclosed questionnaire in the stamped envelope by August 24th.

Thank you for your cooperation.

Sincerely,

Al Rudisill

Alvin E. Rudisill, Head
Department of Industrial Arts
and Technology

hs

Enclosures

Confidential Questionnaire

Code No. _____
(To Identify Company Only)

IOWA GRAPHIC ARTS INDUSTRY MANPOWER STUDY

OFFSET LITHOGRAPHY				
LETTERPRESS				
GRAVURE				
SCREEN				
PHOTOGRAPHY				
LETTERSET				
ELECTROSTATIC				
OTHER				

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PLEASE FILL OUT THE OTHER SIDE

Items 8 - 12 pertain ONLY to Skilled Occupational Employees Involved in the Offset Lithography Production Area

PRODUCTION AREAS

OCCUPATIONAL TITLES

8. Fill in additional offset lithography occupational titles used by your company in blank spaces provided

9. Fill in number of persons you employ in each occupation

10. Place a check under each occupation indicating desired education level of employee

11. Preferred source of skilled employees in each occupation (see key)

12. Indicate how many months a person must work in each occupation before he is considered a skilled employee

60

COMPETENCY VALIDATION INSTRUMENT

JOB TITLE: LAY-OUT MAN
Alternate Titles: Production Supervisor; Copywriter; Writer-Editor; Graphics Preparation Foreman.
DOT Title: Lay-Out Man - 141.081

PART I

Please place a check mark in the appropriate square to indicate how frequently the following tasks are performed

	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER
1. Meeting with customers to discuss job requirements, approximate costs and layout possibilities.					
2. Preparing of thumbnail, rough and comprehensive layouts.					
3. Apportioning of space and positioning of photographs and illustrations on layout.					
4. Determining sizes of illustrations to be used.					
5. Recommending type styles and sizes to be used.					
6. Recommending paper stock to be used.					
7. Directing activities of art personnel in preparation of drawings, cartoons and similar materials.					
8. Selecting of clip-art to be used.					
9. Directing activities of photographer in taking of photographs.					
10. Marking up layouts for composing personnel.					
11. Writing of material for printing jobs.					
12. Proofreading of composed copy.					
13. Meeting with customer to discuss proofs of paste-up and to obtain final approval for printing.					
14. Organizing of previous job samples for promotional use.					
15. Maintaining of schedule for job progression and completion.					
PLEASE LIST OTHER SKILLED TASKS YOU DO AS A REGULAR PART OF YOUR JOB:					

COMPETENCY VALIDATION INSTRUMENT

JOB TITLE: PASTE-UP MAN
Alternate Titles: Paste Make-Up; Paste-Up Artist; Keyline Artist.
DOT Title: Paste-Up Man 979.381

PART I

Please place a check mark in the appropriate square to indicate how frequently the following tasks are performed:

	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER
1. Cropping of photographs using marginal or overlay method.					
2. Scaling copy for cameraman using a proportion scale.					
3. Making lines on mechanical paste-up using ruling pens.					
4. Making designs or improving copy with a croquill pen.					
5. Using rubber cement for mounting materials.					
6. Using waxing machine for mounting materials.					
7. Making a composite by combining the images from two separate photographs					
8. Producing hand lettering for use in paste-up mechanicals.					
9. Using pasteup lettering in paste-up mechanicals.					
10. Making photocopies or photostats of either halftone or line work.					
11. Using photocopies or photostats as copy on mechanicals.					
12. Retouching of linework with ruling pen, retouch grays, lampblack or poster white.					
13. Retouching of photographs with airbrush, sable brush with water color, or sharp blade.					
14. Making multiple color paste-ups using transparent overlay sheets.					
15. Lubricating, maintaining and minor repairing of tools and equipment.					
16. Writing of instructions for cameraman.					
PLEASE LIST OTHER SKILLED TASKS YOU DO AS A REGULAR PART OF YOUR JOB:					

COMPETENCY VALIDATION INSTRUMENT

JOB TITLE: LITHOGRAPHIC CAMERAMAN
Alternate Titles: Cameraman; Copy Cameraman; Photolithographer; Process Man.
DOT Title: Photographer, Lithographic 972.382

PART I

Please place a check mark in the appropriate square to indicate how frequently the following tasks are performed:

	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER
1. Mixing chemicals using graduates, beakers, and stirrers to prepare liquid solutions to manufacturers specifications.					
2. Producing line negatives with process camera for single color reproduction.					
3. Producing line negatives with process camera for multiple color reproduction.					
4. Producing halftone negatives with process camera and contact screen for single color reproduction.					
5. Producing halftone negatives with process camera and contact screen for duotone reproduction.					
6. Producing halftone negatives with process camera and autoscreen ortho film.					
7. Producing halftone separation negatives by direct method for process color reproduction.					
8. Producing halftone separation negatives by indirect method for process color reproduction.					
9. Producing color key proofs with either 3M color key or 3M transfer-key color proofing systems.					
10. Producing line film positives from line film negatives, or vice versa, using contact printer.					
11. Producing continuous tone film positives from continuous tone film negatives, or vice versa, using contact printer.					
12. Producing paper prints from film positives or film negatives using contact printer.					
13. Producing paper prints from film negatives or positives using photo-stabilization processor.					
14. Producing film negatives or positives from camera copy other than usual black ink on white paper using combinations of filters & film.					
15. Maintaining, lubricating and minor repairing of equipment.					
16. Major repairing of equipment.					
PLEASE LIST OTHER SKILLED TASKS YOU DO AS A REGULAR PART OF YOUR JOB:					

COMPETENCY VALIDATION INSTRUMENT

JOB TITLE: STRIPPER
Alternate Title: Flatter
DOT Title: Photoengraver-Stripper 971.381

PART I

Please place a check mark in the appropriate square to indicate how frequently the following tasks are performed:

	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER
1. Opaquing line negatives on light table using a brush and opaque solution to block out unnecessary light sources.					
2. Strengthening a positive with a croquill pen to opaque all light spots.					
3. Improving positives or negatives with a scriber or litho needle to remove undesirable images.					
4. Scribing uniform width lines on positives or negatives using litho needle and straightedge.					
5. Laying out and stripping flats for single color negative, positive, halftone or combination single page jobs.					
6. Laying out and stripping flats for single page multiple color jobs.					
7. Laying out and stripping flats for step-and-repeat jobs.					
8. Laying out and stripping single flat for multiple page reproduction.					
9. Laying out and stripping flats for booklet dummy or signature imposition.					
10. Using precision layout table with vernier spacing mechanism to lay out and strip flats.					
11. Laying out and stripping flats for color process reproduction.					
12. Laying out and stripping negatives and positives on a transparent plastic film base.					
13. Exposing and processing of proofs of flats (blue line, 3M color key, etc.).					
14. Coding flats for color, printing sequence, number of burns, etc.					
15. Maintaining, lubricating and repairing of equipment.					
PLEASE LIST OTHER SKILLED TASKS YOU DO AS A REGULAR PART OF YOUR JOB:					

COMPETENCY VALIDATION INSTRUMENT

JOB TITLE: PLATEMAKER
Alternate Titles: Composer; Lithographic Press-Platemaker; Photomechanical.
DOT Title: Transferrer 972.381

PART I

Please place a check mark in the appropriate square to indicate how frequently the following tasks are performed:

	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER
1. Coating (with deep etch coating solution using horizontal whirler), exposing and developing of zinc, bimetal or trimetal plates.					
2. Exposing and developing pre-sensitized paper plates using arc lights and vacuum frame.					
3. Exposing and developing pre-sensitized aluminum plates using arc lights and vacuum frame.					
4. Exposure and development of photo-direct pre-sensitized plates using automatic camera or projector-type platemaker.					
5. Operation of automated equipment for exposing, developing, rinsing, gumming, and drying of plates.					
6. Making corrections, additions or deletions to plates after development.					
7. Exposing and developing of plates from step-and-repeat flats.					
8. Exposing and developing of plates for color process jobs.					
9. Applying preservative to plates.					
10. Maintaining, lubricating and minor repairing of equipment.					
11. Major repairing of equipment.					
PLEASE LIST OTHER SKILLED TASKS YOU DO AS A REGULAR PART OF YOUR JOB:					

COMPETENCY VALIDATION INSTRUMENT

JOB TITLE: OFFSET PRESS MAN
Alternate Titles: Lithographic Press Man; Offset Press Operator.
DOT Title: Offset Press Man 651.782

PART I

Please place a check mark in the appropriate square to indicate how frequently the following tasks are performed:

	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER
1. Setting up, adjusting and operating a sheet fed, single color offset press.					
2. Setting up, adjusting and operating a sheet fed, multiple color offset press.					
3. Setting up, adjusting and operating a web fed, single color offset press.					
4. Setting up, adjusting and operating a web fed, multiple color offset press.					
5. Lubricating, maintaining and minor repairing of an offset press.					
6. Major repair of an offset press.					
7. Mixing of inks according to formula or color matching.					
8. Printing of multiple color jobs.					
9. Printing of color process jobs.					
10. Washing up the offset press.					
11. Cleaning and applying preservative to offset plates.					
12. Storing of offset plates.					
13. Taking inventory of paper stock.					
PLEASE LIST OTHER SKILLED TASKS YOU DO AS A REGULAR PART OF YOUR JOB:					

PART II

1. Please check the highest educational level you have completed.

___ ELEMENTARY
___ JUNIOR HIGH SCHOOL
___ HIGH SCHOOL
___ TWO YEARS COLLEGE
___ FOUR YEARS COLLEGE

2. Please check the type(s) of occupational training you have completed:

___ HIGH SCHOOL VOCATIONAL TRAINING
___ AREA SCHOOL VOCATIONAL TRAINING
___ IN-PLANT COMPANY TRAINING
___ UNION APPRENTICESHIP
___ INDUSTRY SPONSORED WORKSHOPS
___ FOUR YEAR COLLEGE PROGRAM
___ OTHER: (Please List)

_____

_____

_____

_____

3. Please indicate the total amount of time spent in various occupational training programs:

___ 6 MONTHS
___ 1 YEAR
___ 2 YEARS
___ 3 YEARS
___ 4 YEARS
___ 5 YEARS
___ MORE THAN 5 YEARS

4. Please indicate the total number of years you have been employed (not counting training period) in your present occupation:

___ LESS THAN 1 YEAR
___ 2 TO 3 YEARS
___ 4 TO 6 YEARS
___ 7 TO 10 YEARS
___ 11 TO 15 YEARS
___ MORE THAN 15 YEARS

5. Please indicate your status in regard to Union membership:

___ NOT A UNION MEMBER
___ UNION MEMBER

_____
(write in name of union)

6. INDICATE THE FREQUENCY YOU USE THE TOOLS LISTED BELOW. CHECK ONE OF THE FIVE COLUMNS FOR EACH TOOL.

	DAILY	WEEKLY	MONTHLY	YEARLY	NEVER
Artist Brushes					
T-square					
Scales					
Triangles					
Drawing Board					
Knife					
Light Table					
Paper Trimmer					
Waxing Machine					
Ruling Pens					
Varityper					
IBM Composer					
Proportion Calculator					
Photo Lettering Machine					
Air Brush					
Chemical Mixer					
Graduates, Beakers, and Stirrers					
Color Analyzer					
Densitometer					
Magnifying Glass					
Developing Trays					
Temperature Controlled Sink					
Color Filters					
Balance Scales					
Thermometers					
Print Dryer					
Film Dryer					
Direct Transfer Processor					
Color Enlarger System					
Enlarging Easel					
Opaquing Brush					
Croquill Pen					
Dot Etch Table					
Litho Needle					
Scriber					
Horizontal Whirler					
Vacuum Frame					
Safelights					
Arc Lamps					
Timers					
Micrometers					
Platemaking Machine					
Ink Knife					
Power Ink Mixer					
Ink Matching Scale					
Offset Duplicator					
Sheet Fed Single Color Offset Press					
Sheet Fed Multi-color Offset Press					
Web Fed Offset Press					
Guillotine paper Cutter					
Safety Cans (rags)					
Safety Cans (solutions)					
OTHER EQUIPMENT UTILIZED: (please list)					